

2011

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Recommended Citation

Yilmaz, Harun and Sahin, Sami (2011) "Pre-Service teachers' Epistemological beliefs and Conceptions of Teaching," *Australian Journal of Teacher Education*: Vol. 36: Iss. 1, Article 6.

Available at: <http://ro.ecu.edu.au/ajte/vol36/iss1/6>

This Journal Article is posted at Research Online.

<http://ro.ecu.edu.au/ajte/vol36/iss1/6>

Pre-Service Teachers' Epistemological Beliefs and Conceptions of Teaching

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Abstract: This study aimed to investigate pre-service teachers' views about teaching and the relation of those views to epistemological beliefs, gender, and subject areas. The data collection tool was adapted from "The Traditional Teaching (TT) and Constructivist Teaching (CT) Scale," developed by Chan and Elliot (2004). Participants consisted of 490 pre-service teachers from different teacher education programs in Turkey. Principal component analysis was carried out, and nine items were removed from the adapted questionnaire because of low loadings. The data analysis showed that pre-service teachers preferred constructivist teaching views more than traditional teaching views, and this correlated with their epistemological beliefs. Male participants preferred constructivist teaching views significantly more than female participants did. Freshmen, sophomores, and those from English language programs preferred traditional teaching significantly more than others did.

Introduction

Teachers' beliefs, practices, and attitudes should be considered in order to understand and improve educational processes (OECD, 2009). Although most teachers have received the same type of training during their pre-service study, their practices in the classroom vary. Instructional practices heavily depend on teachers and their professional ability of teaching (Campbell, McNamara, & Gilroy, 2004). Furthermore, teachers are considered as a change agent in an education system that is under the scope of an ongoing reform (Prawat, 1992; Carrington, Deppeler, & Moss, 2010). Teachers' beliefs are an important factor that stimulates change processes in schools, as well as the adoption of new techniques and strategies to be used in classrooms (Fluck & Dowden, 2010). Moreover, knowing pre-service teachers' beliefs about knowledge, teaching, and learning is important because these beliefs play a crucial role in their own learning (Uzuniriyaki & Boz, 2007) and in their pedagogical understanding, as well as their teaching methods and classroom practices (Bryan, 2003).

Belief has been defined as a preference of doing something (Pintrich, 1990). Pre-service teachers gain teaching experience in the classroom during their teacher education,

and this experience affects their beliefs about teaching. Stuart and Thurlow (2000) explain that teachers have been affected by their teachers and teach accordingly. Chan and Elliot (2004) express that teachers' conceptions of teaching and learning are affected by their beliefs. Thus, identifying pre-service teachers' beliefs and conceptions about teaching is necessary to prepare pre-service teachers for real-world teaching. According to Richardson (1996), there is a direct connection between teachers' beliefs and their teaching practices. If a pre-service teacher's beliefs are not developed according to constructivism, the teacher is likely to fail when he or she begins constructivist teaching (Guyton, 2000). Therefore, it is important for both teachers and teacher candidates to be exposed to constructivist teaching, in order to construct or reconstruct their beliefs about teaching.

Epistemological beliefs affect pre-service teachers' conceptions about teaching and learning, which can be categorized as mainly traditional teaching and learning, or constructivist teaching and learning (Cheng, Chan, Tang, & Cheng, 2009; Eren, 2010). Chan (2003) found that pre-service teachers with constructivist conceptions are likely to hold beliefs that knowledge is tentative and changing, and that one's ability is not inborn, whereas pre-service teachers with traditional conceptions are likely to hold beliefs that knowledge is certain and unchanging. Chan and Elliott (2004) found that the pre-service teachers' innate/fixed ability beliefs, authority/expert knowledge beliefs, and certainty knowledge beliefs are positively linked to their traditional conceptions, whereas learning/effort process beliefs are negatively related to constructivist conceptions (for similar results, see Cheng et al., 2009). The concept of epistemological beliefs was introduced by Perry (1968) and was refined by Schommer (1990) in five dimensions, which are certainty of knowledge (from absolute to tentative), structure of knowledge (simple to complex), source of knowledge (handed down by authority to derived by reason), control of knowledge (ability to learn is fixed at birth to learning ability can be changed), and speed of knowledge acquisition (knowledge is acquired quickly or not at all to knowledge is acquired gradually). However, various domains of personal epistemology and inventories have been raised by researchers (Phillips, 1998; Clarebout, Elen, Luyten, & Bamps, 2001; Buehl, 2003; Bråten & Strømsø, 2005; Schommer-Aikins, Duell, & Hutter, 2005). In this current study, pre-service teachers' beliefs about learning and intelligence are examined, as well as beliefs about the nature of reality, since they are all part of teaching and learning.

Constructivist teachers teach in a more student-centered environment, rather than teacher-centered. Constructivist teachers should not be a center of information; they are not responsible for transmitting knowledge to students (Doolittle & Hicks, 2003). The constructivist teacher is responsible for creating a learning environment in which students interact with peers and the teacher, and for providing students with opportunities to use previous knowledge to construct new knowledge. In this environment, teachers facilitate the learning process of students by giving directions and clues. Constructivism proposes that students build their knowledge based on previous knowledge, so they need to be actively involved in the learning process (Brady, 2004). Furthermore, in a constructivist classroom, students interact with each other as well as with content, which enables them to be active participants and to be responsible for their learning process. Therefore, the more active students are in the learning process, the more likely they are to be engaged (Brady, 2004). In some cases, constructivist teachers need to use direct teaching, at which

point they should establish the extent of that type of teaching and give students opportunities to construct knowledge by themselves (Marlowe & Page, 1998). Since social constructivists believe that knowledge is constructed internally through exchanging ideas among learners as well as by learners' own experiences, it is important for teachers to create an ideal environment for students in class (Brady, 2004).

Traditional teachers teach in a didactic manner and function as an information source during teaching (Brooks & Brooks, 1999). They are also responsible for disseminating information to students. Traditional teachers look for the correct answer to know whether students learn what is taught. However, constructivist teachers are responsible for setting up the learning environment for students and facilitating interactions among students and themselves. While constructivist teachers need more time to prepare a learning environment than traditional teachers, traditional teachers cover the learning subject in a shorter time than constructivist teachers (Slavin, 2006). Computers play a crucial role to help constructivist teachers create the kind of learning environment in which students are active during their learning (Brady, 2004; Fluck & Dowden, 2010).

The OECD (2009) published two indices for teachers' beliefs about teaching based on the following questionnaire items:

Direct transmission beliefs about teaching:

- Effective/good teachers demonstrate the correct way to solve a problem.
- Instruction should be built around problems with clear, correct answers, and around ideas that most students can grasp quickly.
- How much students learn depends on how much background knowledge they have; that is why teaching facts is so necessary.
- A quiet classroom is generally needed for effective learning.

Constructivist beliefs about teaching:

- My role as a teacher is to facilitate students' own inquiry.
- Students learn best by finding solutions to problems on their own.
- Students should be allowed to think of solutions to practical problems themselves before the teacher shows them how they are solved.
- Thinking and reasoning processes are more important than specific curriculum content.

The OECD (2009) also published information about country differences in profiles of teachers' beliefs about instruction. "Besides this general agreement on beliefs about instruction, countries differ in the strength of teachers' endorsement of each of the two approaches. The preference for a constructivist view is especially pronounced in Austria, Australia, Belgium, Denmark, Estonia and Iceland. Differences in the strength of endorsement are small in Brazil, Bulgaria, Italy, Malaysia, Portugal and Spain. Hence teachers in Australia, Korea, northwestern Europe and Scandinavia show a stronger preference for a constructivist view than teachers in Malaysia, South America and southern Europe. Teachers in eastern European countries including Turkey lie in between" (p. 94).

Some research results reflect the idea that teachers' practices in the class are derived from their beliefs regarding teaching and learning (Chan, 2003). According to Perry, as cited in Brownlee, Purdie, and Boulton-Lewis (2001), "Epistemological beliefs

or beliefs about knowing reflect an individual's views on what knowledge is, how it can be gained, its degree of certainty, and the limits and criteria for determining knowledge" (p. 247). Windschitl and Andre (1998) declared that "individuals with more advanced epistemological beliefs learned more with a constructivist treatment" (p. 145). Parallel to Windschitl and Andre's study, students who have advanced epistemological knowledge believe that knowledge is tentative and evolving, and this type of knowledge is likely to trigger and support the owner's efforts to generate conceptual change (Mason, 2002). There are many studies indicating that more advanced epistemological beliefs are associated with better learning (Bromme, Kienhues, & Stahl, 2008). Moreover, advanced epistemological beliefs play an important role in advancing constructivist teaching practices (Windschitl, 2002; Chai & Khine, 2008).

According to Nespor (1987), change is not possible without first disposing of current beliefs. Replacement of current beliefs with the intended ones takes time; it happens slowly. Thus, knowing pre-service teachers' beliefs regarding constructivism and their conceptions about teaching and learning is important for changing their beliefs accordingly before they start their teaching careers (Chan & Elliott, 2004; Eren, 2009).

Method

Purpose of the research and the research questions

The primary purpose of this study was to identify pre-service teachers' conceptions of teaching and their epistemological beliefs, and the relation between the conceptions and the beliefs.

Three questions were identified to achieve these purposes:

Question 1: What are the pre-service teachers' conceptions of teaching?

Question 2: What are the pre-service teachers' epistemological beliefs?

Question 3: Is there a relation between pre-service teachers' conceptions of teaching and their epistemological beliefs?

The secondary purpose of this study was to examine whether there is a relation between pre-service teachers' conceptions of teaching and their personal characteristics (gender, subject area, and class level).

Three questions were identified to achieve these purposes:

Question 4: Is there a relation between pre-service teachers' conceptions of teaching and their gender?

Question 5: Is there a relation between pre-service teachers' conceptions of teaching and their subject areas?

Question 6: Is there a relation between pre-service teachers' conceptions of teaching and their class levels?

The survey method was used in this study. The data was collected through a web-based survey over the course of four weeks. The web-based survey was made available to all participants, and the participants were informed about the survey through emails and announcements published on school websites.

The research instrument

The data collection tool was adapted from the traditional teaching and constructivist teaching scales developed by Chan and Elliot (2004). These scales were validated with 385 teacher education students of a tertiary institution in Hong Kong. The questionnaire used a 5-point Likert-type scale (1: Never, 2: Rarely, 3: Sometimes, 4: Often, and 5: Always). The original questionnaire had 30 items with an alpha reliability of 0.84 and a factor loadings range of 0.33-0.67. The original questionnaire included 30 items collected in two parts, labeled as traditional teaching and constructivist teaching.

The original questionnaire was translated into Turkish by the researchers and reviewed by an Turkish language expert. During the translation process, some words and concepts were clarified through explanation. A section measuring participants' epistemological beliefs was also integrated into questionnaire. After translation, a pilot test of the questionnaire was conducted to identify whether there were any sections that might be misunderstood or incomprehensible. The pilot study was conducted among 38 pre-service teachers via the Internet. The questionnaire, along with an assessment tool, was delivered to participants, explaining the purpose of the pilot study and requesting them to assess the questionnaire and identify possible areas that needed correction or clarification. We corrected six such expressions in the questionnaire as a result of the pilot study. Consequently, we decided that the questionnaire fit the purpose of the research.

The research participants

From different teacher education programs in Turkey, about 2500 students were solicited to participate in the survey. Out of the 2500, 460 students (18.4%) participated in the survey. The participants consisted of 280 males and 210 females. The participants' class level distribution was 194 from the first-year class, 106 from the second-year class, 100 from the third-year class, and 60 from the fourth-year class. The participants' disciplinary affiliations are shown in Table 1.

Discipline	Frequency
Primary Education	107
English Language Education	103
Elementary Mathematics Education	70
Elementary Biology Education	41
Science Education	40
Social Studies Education	27
Religion Education	24
Computer Education	21
Turkish Language	14
Chemistry Education	13
Overall	460

Table 1: Participants' distribution by disciplines.

The research procedure

In order to locate pre-service teachers to participate in the survey, an announcement was made on the websites of various teacher education programs in Turkey, and an email was sent to students of those programs. Both the announcement and the email informed students that the study was voluntary and no credit would be given. The announcement and email both asked students to click on a URL to fill in the web-based questionnaire. Participants were asked to provide some demographic information, including gender, university name, program name, and year in the program; however, they had no opportunity to provide their names.

The Results

The principle component analysis of the questionnaire and its reliability

Executing principal component analysis with a varimax rotation, we decided that two components (Conceptions of Constructivist Teaching and Conceptions of Traditional Teaching) were appropriate since they counted for 60.76% percent of the total variance, and only those two components' eigenvalues were calculated to be greater than one (3.58 and 2.50). According to Kaiser (1960), we can retain only components with eigenvalues greater than one. One item in the constructivist section (item number 2) and eight items in the traditionalist section (items 13, 18, 23, 24, 25, 27, 29, and 30) of the adapted questionnaire were removed because of low loadings. The remaining items and their loadings are shown in Table 2. Alpha reliability was calculated for both parts of the questionnaire: 0.85 for the constructivist section and 0.83 for the traditionalist section.

Conceptions of Constructivist Teaching		Conceptions of Traditional Teaching	
Items	Loadings	Items	Loadings
1	0.70	14	0.47
3	0.75	15	0.65
4	0.61	16	0.67
5	0.64	17	0.64
6	0.69	19	0.66
7	0.49	20	0.66
8	0.70	21	0.59
9	0.65	22	0.66
10	0.79	26	0.66
11	0.77	28	0.59
12	0.66		

Table 2: Component loadings.

Items describing conceptions of constructivist teaching are listed below in Table 3.

Items	Conceptions of Constructivist Teaching
1	It is important that a teacher understand the feelings of the students.
3	Learning means that students have ample opportunities to explore, discuss, and express their ideas.
4	In good classrooms, there is a democratic and free atmosphere that stimulates students to think and interact.
5	Every child is unique or special and deserves an education tailored to his or her particular needs.
6	Effective teaching encourages more discussion and hands-on activities for students.
7	The focus of teaching is to help students construct knowledge from their learning experience instead of through knowledge communication.
8	Instruction should be flexible enough to accommodate individual differences among students.
9	Different objectives and expectations in learning should be applied to different students.
10	Students should be given many opportunities to express their ideas.
11	The ideas of students are important and should be carefully considered.
12	Good teachers always make their students feel important.

Table 3: Conceptions of constructivist teaching.

Items describing conceptions of traditional teaching are listed below in Table 4.

Items	Conceptions of Traditional Teaching
14	During the lesson, it is important to keep students confined to the textbooks and the desks.
15	Learning means remembering what the teacher has taught.
16	Good students keep quiet and follow the teacher's instruction in class.
17	The traditional/lecture method for teaching is best because it covers more information/knowledge.
19	Good teaching occurs when there is mostly the teacher talking in the classroom.
20	Learning mainly involves absorbing as much information as possible.
21	Students have to be called on all the time to keep them under control.
22	Teaching is to provide students with accurate and complete knowledge rather than encourage them to discover it.
26	Learning to teach simply means practicing the ideas from lecturers without questioning them.
28	Teaching is simply telling, presenting, or explaining the subject matter.

Table 4: Conceptions of traditional teaching.

Question 1: Teaching conceptions

The means and standard deviations of the survey items are shown in Table 5. The participants often agreed with conceptions of constructivist teaching ($M = 4.25$), while they sometimes agreed with traditional conceptions ($M = 2.78$). Standard deviations also revealed that the pre-service teachers are more homogeneous in believing conceptions of constructivist teaching ($SD = 0.88$) than of traditional teaching ($M = 2.78$).

Conceptions of Constructivist Teaching			Conceptions of Traditional Teaching		
Items	Means	Standard Deviations	Items	Means	Standard Deviations
1	4.40	0.88	14	3.07	1.24
3	4.29	0.84	15	2.73	1.16
4	4.15	0.88	16	2.60	1.22
5	4.22	0.92	17	2.03	1.14
6	4.25	0.84	19	3.12	1.19
7	3.86	0.97	20	2.86	1.16
8	4.19	0.85	21	2.78	1.15
9	4.12	0.85	22	2.95	1.29
10	4.47	0.80	26	2.21	1.20
11	4.51	0.84	28	3.41	1.14
12	4.25	0.96			
Overall	4.25	0.88		2.78	1.19

(Scale is 1: Never, 2: Rarely, 3: Sometimes, 4: Often, and 5: Always.)

Table 5: Descriptive results for constructivist view of teaching.

Question 2: Epistemological beliefs

Table 6 presents means and standard deviations for the pre-service teachers' epistemological beliefs. Results indicated that the pre-service teachers rarely believe that reality is singular and the same for all people (M = 2.48); that in almost all learning situations, intelligence is multiple (M = 4.45), such that every person learns some subjects more easily than others; that learning is dependent on study rather than skill (M = 3.89); and that if appropriate conditions are provided, everyone learns everything in many learning situations (M = 3.85). The first belief is rooted in a traditionalist world view while the last three are rooted in a constructivist world view. Therefore, it is reasonable to assume that the pre-service teachers have a tendency toward the constructivist approach.

	Mean	Standard Deviation
Reality is single and same for all.	2.48	1.29
Intelligence is multiple, such that every person learns some subjects better than others.	4.45	0.95
Learning is dependent on study rather than skill.	3.89	0.99
If appropriate conditions are provided, everyone learns everything.	3.85	1.10

(Scale is 1: Never, 2: In rare situations, 3: In some situations, 4: In many situations, and 5: In all situations.)

Table 6: Descriptive results for epistemological beliefs.

Question 3: The relation between teaching conceptions and epistemological beliefs

The belief that *reality is single and same for all* was found to be negatively correlated with the conception of constructivist teaching ($r = -0.141$, $P < 0.01$) and positively correlated with the conception of traditional teaching ($r = 0.153$, $P < 0.01$). The belief that *intelligence is multiple, such that every person learns some subjects better than others* was found to be positively correlated with the conception of constructivist

teaching ($r = 0.413, P < 0.01$) and negatively correlated with the conception of traditional teaching ($r = -0.171, P < 0.01$). The belief that *learning is dependent on study rather than skill* was found to be positively correlated with both the conceptions of constructivist teaching ($r = 0.205, P < 0.01$) and traditional teaching ($r = 0.099, P < 0.05$). The belief that *if appropriate conditions are provided, everyone learns everything* was found to be positively correlated with the conception of constructivist teaching ($r = 0.296, P < 0.01$) and negatively correlated with the conception of traditional teaching ($r = -0.018, P > 0.05$), although not statistically significant.

Question 4: The relation between teaching conceptions and gender

The pre-service teachers differed in their conceptions of constructivist teaching depending on their gender ($t_{(488)} = 5.75, P < 0.05$). Males preferred constructivist teaching ($M = 4.31$) more often than females did ($M = 4.19$). On the other hand, the difference between both genders for traditional teaching was found to not be statistically significant, although females preferred traditional teaching more than males did. Table 7 presents the means of conceptions of teaching by gender.

Gender	Conceptions of Constructivist Teaching	Conceptions of Traditional Teaching
Female	4.19	2.89
Male	4.31	2.80
Overall	4.26	2.84

Table 7: Means of conceptions of teaching by gender.

Question 5: The relation between teaching conceptions and subject area

No significant differences were found among students' conceptions of constructivist teaching depending on their subject areas, whereas significant differences among students' conceptions of traditional teaching were found depending on their subject areas ($F_{(10, 485)} = 6.475, P < 0.001$). Post hoc comparisons executed with the Scheffe test showed that participants from English language programs preferred traditional teaching more than students from all the other programs did, except for religion and social studies. These three programs each had a mean above three, whereas the others were below three. Table 8 presents means of conceptions of teaching by subject area.

Discipline	Conceptions of Constructivist Teaching	Conceptions of Traditional Teaching
Primary Education	4.26	2.73
English Language Education	4.23	3.24
Elementary Mathematics Education	4.25	2.73
Elementary Biology Education	4.28	2.65
Science Education	4.24	2.63
Social Studies Education	4.21	3.09
Religion Education	4.03	2.94
Computer Education	4.31	2.43
Turkish Language	4.50	2.36
Chemistry Education	4.25	2.82
Overall	4.25	2.84

(Scale is 1: Never, 2: Rarely, 3: Sometimes, 4: Often, and 5: Always.)

Table 8: Means of conceptions of teaching by subject area.

Question 6: The relation between teaching conceptions and class level

The results showed that there were significant differences among students' conceptions of constructivist teaching ($F_{(3, 486)} = 3.159, P < 0.05$) and traditional teaching ($F_{(3, 486)} = 34.841, P < 0.001$) depending on their class levels. Third-year students ($M = 4.40$) preferred constructivist conceptions of teaching significantly more than first- ($M = 4.25$), second- ($M = 4.15$), and fourth-year students ($M = 4.23$). While first-year students ($M = 3.12$) preferred traditional conceptions of teaching significantly more than second- ($M = 2.90$), third- ($M = 2.34$), and fourth-year students ($M = 2.65$), third-year students preferred it significantly less than others. Table 9 presents means of conceptions of teaching by class level.

Class Level	Conceptions of Constructivist Teaching	Conceptions of Traditional Teaching
First Year	4.25	3.12
Second Year	4.15	2.90
Third Year	4.39	2.35
Fourth Year	4.23	2.65
Overall	4.26	2.84

(Scale is 1: Never, 2: Rarely, 3: Sometimes, 4: Often, and 5: Always.)

Table 9: Means of conceptions of teaching by class level.

Discussion

The questionnaire

We found that the two-component model was appropriate for the questionnaire by executing principal component analysis. However, one item in the constructivist section and eight items in the traditionalist section of the adapted questionnaire were removed because their loadings were low or inconsistent. Similar to our results, Eren (2009) carried out a confirmatory factor analysis for the same questionnaire and found that one item in the constructivist conception subscale and a total of nine items in the traditional conception subscale had insignificant and/or low parameter estimations. According to

Eren (2009), this may be due to the cultural differences between two samples, highlighting that Turkish student teachers perceived traditional conceptions about teaching and learning differently than their peers in Hong Kong. We see that traditional teaching practices differ in different educational systems and have different meanings in different cultures, and thus teachers' conceptions of traditional teaching may differ around the world. On the other hand, since the meanings of the constructivist teaching items are built upon the principles and theories of constructivism, they are not expected to differ by country. Conclusively, we recommend similar studies with different samples to shape the questionnaire more globally.

Conception of Teaching

We found that the pre-service teachers often agreed with conceptions of constructivist teaching, while they sometimes agreed with traditional ones. We also found that the pre-service teachers were more homogeneous in believing conceptions of constructivist teaching than traditional ones. Our findings confirm the 2009 OECD report that teachers in eastern European countries prefer a constructivist view of teaching more than traditional or directive views. Researchers assert that while some teachers either fail to take up reforms or actively resist educational innovations (Fullan, 1993), many others make changes to their teaching by adopting easily assimilated practices into their methods of teaching. On the other hand, Eren (2010) found that pre-service teachers valued constructivist teaching/learning, making learning explicit, and promoting learning autonomy more than they actually practiced those things, whereas they practiced traditional teaching and performance orientation more than they valued it. Klein (1996), in his study of pre-service teachers, argues that teachers' beliefs can be eclectic and contradictory, and that teachers may simultaneously hold both traditional and constructivist views. In his study of the learning and knowledge beliefs of 279 pre-service students from the faculty of education, the majority endorsed a view of learning that included both constructivist and transmission-oriented themes. While the participants in the study may have agreed with the study's constructivist items, they did not simultaneously reject a directive view of teaching.

Beliefs and the effect of belief on conception of teaching

We found that the pre-service teachers rarely believed that reality is single and the same for all, while often believing that intelligence is multiple, learning is dependent on study rather than skill, and that if appropriate conditions are provided, everyone learns everything. The first belief is rooted in a traditional world view while the last three are rooted in a constructivist world view. Therefore, it is reasonable to expect that the pre-service teachers tend toward the constructivist approach. Furthermore, we found that the belief that *reality is single and same for all* was negatively correlated with the conception of constructivist teaching and positively correlated with the conception of traditional teaching; the belief that *intelligence is multiple, such that every person learns some subjects better than others* was positively correlated with the conception of constructivist teaching and negatively correlated with the conception of traditional teaching; the belief

that *learning is dependent on study rather than skill* was positively correlated with both the conceptions of constructivist and traditional teaching; and the belief that *if appropriate conditions are provided, everyone learns everything* was positively correlated with the conception of constructivist teaching and negatively correlated with the conception of traditional teaching, although not statistically significant. Similarly, Perkkilä (2006) found that teachers' practices of teaching differed with their beliefs. Yates (2006) found that teachers with stronger beliefs made greater use of some constructivist teaching practices in their classrooms. Collinson (1996) conducted a case study and found differing beliefs about teaching and learning, which produced tensions between adherents of behaviorist and constructivist paradigms. While some of the teachers were able to articulate the reasons behind their preference for a particular paradigm, others simply "did not have specific vocabulary to describe what they felt" (p.10).

The effect of gender on conceptions of teaching

We found that both genders favored conceptions of constructivist teaching. Furthermore, we found that the pre-service teachers differed in their conceptions of constructivist teaching depending on their gender. Males preferred constructivist teaching more than females did. On the other hand, the difference between genders for traditional teaching was found to not be statistically significant, although females preferred traditional teaching more than males did. These results contradict the literature, which generally agrees that female instructors tend to use constructivist teaching techniques that are more interactive, such as class discussions, small-group discussions, and group projects (Starbuck, 2003). In contradiction to our findings, Eren (2009) concluded that female teacher education students favored constructivist teaching significantly more than males. The results indicate that gender is an issue in approaches to teaching, so further studies investigating gender differences in the conceptualization of teaching will be useful to understand teacher education. Cross-cultural studies would also be useful to explore cultural influences on approaches to teaching.

The effect of subject area on conceptions of teaching

We found that there were no significant differences among students' conceptions of constructivist teaching based on their subject area. However, there were significant differences among students' conceptions of traditional teaching. We found that pre-service teachers from English language programs significantly preferred traditional teaching in comparison to students from all the other programs except religion and social studies. Similarly, Eren (2009) found that pre-service teachers' beliefs about their conceptions of teaching and learning vary as a function of field of study. He compared students of classroom teaching and students of Turkish language teaching and found that classroom-teaching students have more traditional conceptions about teaching and learning than do Turkish-teaching students. Our results did not confirm this finding, but rather went beyond it by including ten teaching subject areas. On the other hand, Yılmaz and Bökeoğlu (2008), in their study of primary teachers' self-efficacy beliefs, found the

field of study insignificant to teachers' beliefs. The results indicate that teacher education programs are one of the important factors affecting future teachers' teaching beliefs. Further research is suggested to examine classroom content and teacher educators' ways of teaching in different programs, and the possible differences among the programs that cause students to conceptualize teaching in certain ways.

The effect of class level on conceptions of teaching

We found that there were significant differences among students' conceptions of constructivist teaching and traditional teaching depending on their class levels. Third-year students preferred constructivist conceptions of teaching significantly more than first-, second-, and fourth-year students, while they preferred traditional conceptions of teaching significantly less than the others. On the other hand, first-year students preferred traditional conceptions of teaching significantly more than second-, third-, and fourth-year students. These results indicate that pre-service teachers' conceptions of traditional teaching change over the years as they take more courses on the principles of constructivist teaching. Our results confirm Eren's finding (2009) that third-year students tended to adopt constructivist conceptions about teaching and learning when compared with first-year, second-year, and fourth-year students. This may be because third-year students perceive themselves as more competent and skillful at coping with the difficulties of a constructivist teaching/learning environment, because students' self-efficacy for teaching increases during university teacher preparation (Kimonen & Nevalainen, 2005). However, while Eren found that fourth-year students preferred to adopt traditional conceptions rather than constructivist conceptions, we found that pre-service teachers from all class levels preferred constructivist teaching rather than traditional. Eren (2009), citing Woolfolk Hoy & Spero (2005), mentioned that fourth-year students may experience a "reality shock" when facing the demands and expectations encountered by experienced teachers. We did not find this to be the case in our study.

Conclusion

The results of our study provide an empirical contribution to the existing literature on teachers' beliefs about teaching and learning by examining pre-service teachers' views about teaching and the relation of those views to personal beliefs (on learning, multiple intelligence, and the nature of reality) and characteristics (gender, subject area, and class level). We found that teachers' conceptions of teaching can be examined under two major categories of teaching practice, traditional and constructivist. We saw that teachers prefer the constructivist way of teaching rather than the traditional way. Our findings suggest that personal characteristics are factors in pre-service teachers' conceptions of teaching. Our results also indicate that pre-service teachers' beliefs affect their views of teaching. We recommend that teacher education programs evaluate their programs and take action to enhance teaching students' epistemological beliefs and conceptions of teaching. We further recommend that researchers carry out similar studies with different samples and in different countries. Cross-cultural studies will be useful to understand how culture affects teachers' beliefs and practices.

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